

CRITERIA FOR INTEGRATION OF FLOWS ON LEVELS OF AGGREGATION

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ABSTRACT

The article describes the processes and connections that occur on the road from of cellular integration to the integration of the supply chain. How to make the transition to higher levels? What is the first step and which approach is essential to ensure continuous improvement? With the changing in the organizational environment nowadays it is not satisfactory only a leveled increase. Global optimum of improvements always overcome the amount of local optimums. This idea and approach must be used when talking about flows and aggregation.

KEYWORDS: *production flow, cellular production, value stream mapping, continuous improvement, biological system*

Today, the manager must permanently increase the rate of achievement of performance to be able to achieve his goals better, faster and cheaper. Globalization, diversification and growth of markets and also the rapid pace of technology development, all contribute to this turbulent environment. Nowadays, organizations are faced more and more with the pressure to reduce expenses, to comply with clients' demand without incurring additional costs and there is a higher request for money from firms that need investments to reengineer their business processes or to pass the difficulties imposed by the harsh economic situation they're going through at present [12]. Today, if you are satisfied with the status quo, you are endangered. For many organizations this is an alarm signal to reconsider the modalities for achieving set targets.

An effective approach to the management company can be done on families of products and not on sections. This approach provides a process for improvement, because you do not do the transaction for each section. In the section approach, if we had five machineries, we had five transactions. The cellular organization reduces the number of transactions engaged in the accounts system, and this mean in the amount of money paid or better said, lost by the organization.

With the information explosion of the recent decades the necessity arises of existence of some problem solving realistic methods, in the conditions of an aprioric incomplete information on the processes and phenomena, in many fields such as criminology, psychology, military, marketing, economic and financial analysis , security, sport and culture. [10]

Cellular production - a platform for improvement

A cell is a small organizational unit that the company has built to analyze the similarities between the way we process information, make products and serve customers. Cellular production supports continuous improvement by careful locating people and materials required for processing products families. Some components may have traveled miles to get into all the workshops and to work through all the processes that brought them into the final form. And some components with different requirements and market characteristics that may have shared the same equipment and the same workforce. After reorganization, the families of similar products are designed together in the limits imposed by the host cell for the majority, or for all the features needed. These cell arrangements allow fast flows and efficient processing of materials and information. Moreover, cellular operators may be trained on several machines, may be involved in the rotation of posts and can assume responsibility for a job that previously belonged to the supervisor or supervisory staff.

Although cell production occurred from 1900, only in 1990 it showed enthusiasm. More testimonials from companies large and small, support the idea of cellular organization in order to increase performance. The following table shows the situation of two producing U.S. companies that have experienced significant improvements in cellular organization. However, this success story is based on a whole series of difficulties. Large differences between columns with maximum improvements and minimum improvements illustrates the fact that the majority of organizations have dramatic fluctuations in terms of improvements in cellular organization. [9]

Table 1 Results of performance achieved by the implementation of cellular manufacturing

Measurement of performance	Wemmerlov and Johnson (46 firms)			Wemmerlov and Hyer (32 firms)		
	Improvement s media	Minimum improvements	Maximum improvements	Improvement s media	Minimum improvements	Maximum improvements
Reduction in travel time	61.3%	15.0%	99.0%	39.3%	10.0%	83.0%
Reduction in time for the final result	61.2	12.5	99.5	45.6	5.0	90.0
Reduction in response time to customer requirements	50.1	0.0	93.2	-	-	-
Reduction of stocks	48.2	10.0	99.7	41.4	8.0	80.0
Reduction in set-up time	44.2	0.0	96.6	32.0	2.0	95.0
Reduction in stocks of finished products	39.3	0.0	100.0	29.2	10.0	75.0
Improvement in quality of products/parties	28.4	0.0	62.5	29.6	5.0	90.0
Reduction in cost per unit	16.0	0.0	60.0	-	-	-

*Lack of results indicates that they are not available

It is never easy to accept that a company's performance is stationary or even declining. It is also never easy to identify what is needed to do in order to change the course. However, the most difficult is to determine how you will identify the course. To understand what are the capabilities is not the same thing with knowing how to develop these capabilities. After a feasibility study within the firm, you can conclude that the production cells can provide the required capacities of the company. You must then analyze how you realize products, to find similarities between production steps, to group products into families and to allocate resources to produce these families. Finding the right families and determination of appropriate technology are important elements in building a cell. However, for cells to function, you must also take into account the company's infrastructure, various subsystems used for planning, directing and controlling operations.

Can we talk about integration at every level? We can integrate information flows, technological flows and material flows at the cellular level. Also we can integrate at the department level. We pass on to integrate the wide company or to the interdepartmental level. A higher level is the inter-relationships between companies. Expansion I propose is to extend to the environment level, including recycling and returning to the environment. How to achieve this shift between several stages of complexity?

The largest chaos and discomforts arise when we don't have what we need. [3]

I propose as a method of flow's integration on aggregation levels, the value stream mapping method, an opportunity to "see the whole", an opportunity to address the system thinking and to strategic demonstrate the validity of the claim "the amount of local optimum is not equal with the global optimum".

Integrated logistics analysis is based on the total cost of logistics activities, heaving in the central level the service to consumers. This means that at a certain level of service to customers we must minimize total logistics costs, rather than try to minimize the cost of individual activities, components of logistics. The attempts to reduce the costs of individual activities can lead to an increase in the total cost. Logistics is thus a fundamental strategic lever to ensure a competitive advantage in the market. [7] One of the biggest challenges for anyone involved in continuous improvement, no matter what discipline or methodology they use, is to know exactly on what level to focus when they begin the improvement projects. The current state is of course considered a starting point. But the mapping? Where it begins or ends?

One approach is to use the matrix of products. This offers a clear definition of the flow value that will be mapped and also offers the implementation team an overview of the final map size. Other organizations, however address the principle of Taichi Ohno, who said "just do it." This approach can be aligned with that of James Womack and Daniel Jones, as they explain in Lean Thinking, in which they expressed the importance of mapping all product families. Both approaches makes clear the term "family of products."

The matrix approach offers clarity on the product family. Many companies were surprised to learn that the items they considered part of the same family of products had very few process steps in common. Also, it is often encountered that products classified as being part of different families, should belong to the same family, due to similarities between them. [3]

Choosing a value stream mapping level

You must determine which is the level where you begin the process of mapping. It is important that in the value stream mapping process, to quickly identify this moment, and also when the map starts and stops. It is critical because it is very easy to slip in and out of other value streams, because the world is involved in multi skills projects and the employees are working in transactional processes. It is also difficult because many suppliers depend on each other in terms of business success. Establish an extended mapping requires cooperation of several departments and divisions within firms and between firms.

Value stream mapping is a process of direct observation of the information and materials flows as they appear, summarizing their visual state and creating a future state that will increase performance plan.

We propose a sequence of two future states, next to an ideal state, after the current state is identified and approved by all members. The first future state will be relatively easy and will create the framework for the second. The second future state is more difficult and the achievement of an ideal state will require a commitment from all companies that come in contact with the product. However, we believe that it will be a economy of time and effort and also an improvements in the quality of every step, will encourage teams to go further once they have learned together how to optimize the flow they share. Finally, along with a creative mind in relation to processes and information technologies, we believe that most of the flows can be compressed and refined to a point where most of the initial steps and almost all the necessary time for the achievement of the result is eliminated. This will be represented by a real revolution and the value stream team which will get there first will have an overwhelming competitive advantage.

Selecting a product family

The idea for value stream mapping is to disaggregate operational problems to the level of specific products, where managers can operate more easily. To do this, we must start from the lowest point (the client) to map and define the product family at that point. Typically, a family of products will include a group of different products that go through the same procedural steps, using similar equipment until the point where they are delivered to customers. Cellular organization supports the identification of families of products as a starting point for process improvement. For example:

- In the auto industry, a family of products could be a platform used for cars (eg. Mounatineer Mercury and Ford Explorer) produced in a factory. In

another situation, it could be a major component used by those who assemble cars - say an alternator - which uses a similar architectural design and is assembled in cells, but the final outcome has a varying power and also has different attach points for every type of vehicle.

Since the family of products is defined from the advantage point of the last mapping point, the concept is essentially "fractional." This means that you can define product families from many starting points and start mapping back along the chain for different selected lengths. As you select cells and continue starting up, it is your first road map to follow a single family of products and components from a single product. *This is necessary because the first goal of an extended level mapping is to get the revolutionary discoveries regarding mass awareness and losses and identify opportunities for overcoming them.*

A visual field that can be controlled

An ideal map would really show the whole. Therefore, we begin with the end customer who uses or consumes the product. The map will then track the product throughout its flow upward to the level of molecules in the ground, showing all activities causing losses and any loss of information on the route. [6]

A walk...

Once you have designated the team and its leader, you should take a walk together along the value stream, draw the current state map and then ask "which steps create value? What step is the loss? Why is so much disruption in the flow? Why is quality so poor? Why are supplies so unsatisfactory? How can it be increased to the final customer value?"

Current state map

Having at hand the basic principles of mapping at a broader level, is time to follow a value stream team as she is mapping the current status of some product families. The value stream map will characterize the flow as he presents today.

Learning to see value

As we note all these actions, the ability to distinguish the steps that create value from the steps that does not create value, and between the time that creates value and the loss time, is something that is very important. Enormous difference between total time and the time that creates value and between total number of actions and the number of actions that create value in a flow is the opportunity that the value stream team must take into account. [6]

Future state 1

Once the team finishes its current state map, everyone agrees it is time for the question "what should be done and at what time, in order to create a better

future state?". For starters it is best to work within the plant. This will increase confidence in the process and participants will make it possible to cultivate the idea that they can do much more.

Future state 2

The second future state of a phenomenon is the introduction of a pulling leveled phenomena, very smooth, which includes frequent deliveries between each plant. This is very simple. What we do is to relate each point where the product is used in a facility at a level below the point of production or delivery of the next higher level. In this way, the point of consumption is met quickly and accurately by the guide process from the upper-level.

Ideal state

Compressing the value stream

So far we have left in place each activity that creates value and we just changed the information flow and delivery frequencies while we removed unnecessary storage and cross supplies. It is obvious that the remaining losses are due to the need to move the product between multiple facilities and also to move it through longer distances. So the next logical step is to compress the value stream relating to value-added activities so that they can be made faster and with less effort.

A value stream plan will show:

- Exactly what your team is intended to meet, step by step
- Measurable objectives for team members
- Checkpoints real clear with deadlines and responsible for the project
- The formula for sharing costs and benefits among the participating firms

Enterprise mapping process is the glue that connects a company's business strategy with processes and systems essential to implement the strategy. [11]

Conclusions

Cells are the center of a vast area of benefits. The most obvious benefit to be achieved inside a cell is the reduction of the set-up time for the motion. This is the result of clustering based on similarity of products and on specific features appropriate for cell production. To build a system for cellular organization we must build cells so that they can reach their full potential.

I think cells are an production platform for future competitiveness and cellular organization that will underpin future challenges:

- Advances in process technology will increase the cells' ability to comply with mixed deliveries, high standards and to do so very quickly.
- Cells and concentrates plants are ideal for integrating resources and expanding the role of employees in decision making. It predicts that frontline employees will have more responsibility, they will control much better and will enter more in contact with customers.

- The integration and competitiveness are supported by the processes within the cells

The challenge for the moment is to use more intense the time and the technologies that we already have.

My proposal for the integration is to look from the top to bottom and see the section as a whole of cells. The trend is to have the entire factory organized in cellular systems. The first criterion is the integration cell and we can then move easily to aggregating in the classical level. The next level is seen as the value stream mapping of the internal flow, which is then going outside to contact with other organizations and external environment.

I also suggest that integration levels of aggregation to be a cyclic integration in loops, like the biological system, being the only workable system in every economical conditions. A modeling of the organizational system and also for the extended supply chain after the biological system, can provide functionality in any period, economic, political or cultural. The same with the integration of cells in systems, the integration of systems in nerve centers and also in aggregation through the entire human body and also after with the integration into the environment together with other bodies, the criteria for the integration of flows can model some basic principles of biological systems. The complexity of biological systems, makes the discipline "Systems Biology" an area of great scientific world. It involves the integration of disciplines such as bioinformatics, mathematical modeling and simulation, systems theory and artificial intelligence. Can we adapt these new technologies for better functioning of our organization?

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